REMARKS

Information Disclosure Statement

The Office noted several citations were not compliant with the provisions of 37 CFR 1.97, 1.98 and MPEP 608. All these references were previously cited in the parent application from which the present application is derived and therefore pursuant to MPEP 609.02, the examiner considers information which has been considered by the Office in a parent application when examining a continuation-in-part application filed under 37 CFR 1.53(b). Furthermore, a listing of the information need not be resubmitted in the continuing application.

In addition, the transmittal letter accompanying the IDS filed on 7/16/2004 expressly noted that, "[p]ursuant to 37 CFR 1.98 (a)(2)(i) applicant has not transmitted herewith copies of cited U.S. Patents and U.S. patent application publications as the above application was filed after June 30, 2003. In accordance with 37 CFR 1.98(d) copies of the references denoted by ** are not provided as they were previously submitted to, or cited by, the Office in prior Application No. 09/746,956 filed 12/22/2000, which is being relied on for an earlier effective filing date under U.S.C. § 120. Should Office require copies of these references, the applicant will be happy to provide them upon request."

However, as requested by the Office, an IDS has been submitted herein for consideration and inclusion in the present application.

Drawings

Applicant acknowledges and thanks the Office for accepting the drawings filed 18 April 2005.

Claim Rejections – 35 USC § 103

The Office has quoted the statute from 35 USC 103(a), which is referenced herein. The Office has rejected claim 1 – 20 as being unpatentable over Martin (U.S. Pat. No. 6,469,358) in view of Kuan (U.S. Pat. No. 6,818,917). Applicant does not concede these to be prior art

references. However, Applicant has carefully considered the Office rejections and respectfully submits that the amended claims, as supported by the arguments herein, are distinguishable from the cited reference.

According to the MPEP §2143.01, "[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found in either the references themselves or in the knowledge generally available to one of ordinary skill in the art." A useful presentation for the proper standard for determining obviousness under 35 USC §103(a) can be illustrated as follows:

1. Determining the scope and contents of the prior art;
2. Ascertaining the differences between the prior art and the claims at issue;
3. Resolving the level of ordinary skill in the pertinent art; and
4. Considering objective evidence present in the application indicating obviousness or unobviousness.

Therefore, obviousness cannot be established by combining prior art references to produce the claimed invention absent some teaching or suggestion supporting the combination. The mere fact that the prior art may be modified in some manner suggested by an examiner upon review of the claims of the present application does not make the modification obvious, unless the prior art suggested the desirability of the modification.

The Board of Patent Appeals and Interferences (BPAI) continues to reverse Examiners that can not explain "why a person of ordinary skill in the art would have found it obvious" to combine the references in the manner proposed by the Examiner." Furthermore, the Applicant notes that none of the references specifically recognized the advantages discussed in the present application.

The Martin reference describes a three color quantum well device that uses the term 'photon in a box' to describe reflective properties. The Office properly notes that Martin does not describe asymmetric quantum well detector layers nor any other related properties or aspects

thereto. Claim 1 has been amended to include features pertaining to the asymmetric quantum wells and therefore the Martin reference is traversed.

With respect to Kuan, the Office states that this patent describes an asymmetric quantum well structure similar to the present invention. More specifically, the Office refers to Kuan Fig. 10a and 10b and alleges that the superlattice structure described therein is similar to the asymmetric quantum well claimed in the present invention. Applicant respectfully disagrees.

Kuan describes a bottom superlattice structure (92) with a number of similar 6nm GaAs wells with 4nm AlGaAs barriers. All the quantum wells are the same and are arranged next to each other, and absorb the same frequency. There is a barrier layer (93) and then a top superlattice structure (94) having all 4.5nm GaAs quantum wells with 6nm AlGaAs barriers. The top superlattice also has all the same quantum wells adjacent to each other and intended to all absorb at the same frequency. In more particular detail: (see Kuan, Col. 6, lines 14-39.)

> Please refer to FIG. 10(a), which shows the band structure of our photodetector in accordance with an embodiment of the present invention. The system we described here is belonged to III/V semiconductor materials. The photodetector of the present invention contains sequentially a bottom contact layer 91, preferably is 500 nm, a bottom superlattice 92, preferably is 14-period, a blocking barrier 93, another top superlattice 94, preferably is 14-period, and a top contact layer 95, preferably is 400 nm. Each period of the bottom 92 and top supelattices 94 is respectively composed of 6 nm GaAs well and 4 nm Al.sub.0.27 Ga.sub.0.73 As barrier, and 4.5 nm GaAs well and 6 nm Al.sub.0.31 Ga.sub.0.69 As barrier.

Thus, Kuan describes a group of similar quantum wells for detecting one spectrum in one of the superlattices and another group of quantum wells for detecting another spectrum in the other superlattice structure. Further details of this multicolor photodetector are in the description of Kuam Fig. 10b and Fig. 11.

In stark contrast, one aspect of the present invention in relation to the Asymetric Unit Cell is described in Figure 9 as follows: (present specification page 17, Par [0066])

> [0066] FIGS. 9a and 9b illustrate band diagrams, eigenstates, and electron distribution associated with an asymmetric quantum well structure configured in accordance with

another embodiment of the present invention. Here, the asymmetric well is provided by virtue of a unit cell that includes two coupled quantum wells. In particular, the design includes a first quantum well configured to absorb a first spectrum (e.g., blue), a second quantum well configured to absorb a second spectrum (e.g., red), and a coupling barrier between the two wells. Outer barriers sandwich the coupled wells, and the second well includes a well spike. [0067] The "blue" and "red" wells can be, for example, GaAs. Only the red well is doped. The barriers sandwiching the wells can be, for example, $Al_{.30\%}Ga_{.70\%}As$. The coupling barrier between the wells, and the well spike in the red well can also be $Al_{.30\%}Ga_{.70\%}As$. The well spike of the red well effectively adjusts the ground state, and not the excited states associated with the red well.

Thus, the present invention comprises a unit cell with two adjacent quantum wells, wherein the adjacent quantum wells are not the same – they are photodetectors for two different spectrums. As shown herein for convenience, Fig. 9a of the present invention shows a blue well for absorption of one spectrum and a red well for absorption of another spectrum. The red and blue well is separated by a coupling barrier and tunable for a spectral response as described in the specification. This is clearly distinguishable from the Kuan group of quantum wells in the top superlattice all being the same type, and the other group of quantum wells in the bottom superlattice being of the same type.

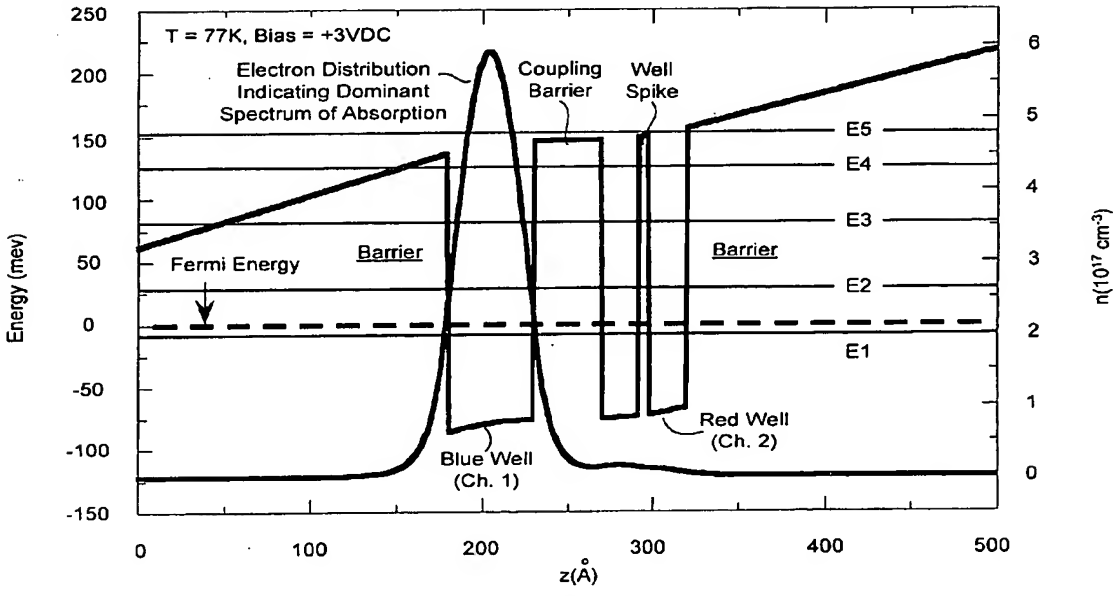


Fig. 9a

Claim 1 has been amended to include the asymmetric quantum well having the unit cell with one quantum well absorbing a first spectrum and another quantum well absorbing another spectrum. The two spectrums are separated by a barrier layer. Claim 11 already contained this feature. Claim 16 has been amended to incorporate the unit cell with two quantum wells absorbing different spectrums.

The Office also alleges that the well spike of claims 8, 11, and 18 of the present application is recited in Kuan. More specifically, the Office states that with respect to Kuan Fig. 10, "[i]n regard to claim 8, note that the 6nm $Al._{31}Ga._{69}As$ barriers in the top superlattice comprise well "spikes"." Applicant does not believe this is an accurate correlation.

As described in the present invention, the 'well spike' effectively adjusts the ground state and thereby controls the spectral response by controlling the energy levels. As noted in the present application in Par [0066], "[t]he well spike of the red well effectively adjusts the ground state, and not the excited states associated with the red well." It is a potential energy spike and is very thin in relation to the well in which it resides as noted in the figure herein and has a large and controllable effect on the energy level of the carriers within the well. This spike can be positive or negative, wherein a positive spike at the well center will raise the ground state energy and move the spectral response to a longer wavelength, and wherein a negative spike at the well center will lower the ground state energy and move the spectral response to a shorter wavelength.

This is not equivalent to the barrier referred to in Kuan. Applicant directs the Office to read the description of Kuan Fig. 10(a) located in Col. 6, lines 14-39. The blocking barrier layer of Kuan, including the 6nm $Al._{31}Ga._{69}As$ barriers in the top superlattice – are barrier layers – they are not well spikes that alter the ground state.

The Office also alleges that Almogy describes the well spike of doped material that is related to the present invention. Once again, Applicant does not believe that this is an accurate correlation.

Almogy does not ever use the term "well spike", and there is nothing in Almogy that is functionally related to the well spike of the present invention. The Almogy reference is related to a doping spike which refers to a technique to provide electrons to the quantum wells. A doping spike refers to a doping technique for providing charge carriers like electrons or holes. This doping technique is a method of confining donor/acceptor impurity atoms to an atomic layer of a host crystal. The well spike of the present invention is a very thin layer of the host crystal itself wherein the composition and thickness of the spike layer is adjusted to directly impact the potential energy of the carriers thereby changing one or more energy levels. There are no well spikes as described in the present invention that adjust the ground state.

Improper Official Notice

On page 3, in the second paragraph, the Examiner rejected claim 6-10 under 35 U.S.C. §103(a) as being unpatentable over Martin in view of Kuan. The Examiner correctly states that Martin does not describe asymmetric quantum wells. To correct this deficiency, the Examiner combines Martin with Kuan and summarily rejects claims 6 – 10 without a detailed analysis of the elements of these claims in relation to the invention of Kuan.

Amended claim 1 includes an aspect from claim 6, such that "each asymmetric quantum well being a unit cell comprising two quantum wells coupled by a barrier, where one of the quantum wells is configured to absorb a first spectrum, and the other quantum well is configured to absorb a second spectrum." The Office does not describe any reference that supports a unit cell having two different wells coupled by a barrier. For at least the reasons stated herein, the Applicant submits that amended claim 1 is patentably distinct over the cited references, whether alone or in combination. If the Office wishes to maintain this rejection, the Applicant respectfully requests a more detailed basis for the rejection.

Similarly, the Office rejects claim 8 by stating that Kuan has barriers. The well spikes in the present invention are different in form and function than the barriers in Kuan and for at least

the reasons stated herein, and the Applicant submits that claim 8 is patentably distinct over the cited references, whether alone or in combination.

Also, the Office rejects claims 11-20 as being 'similar to claims 1-10' without providing any specific clarity or precision as to the unique elements recited in those claims.

Furthermore, the Office rejects claims 1-20 based on Martin in view of Almogy by trying to assert that the only difference between the present claims and Almogy is the asymmetric well design and that this "difference is not patentable because Almogy suggests such asymmetric design for efficient modulation." There is no description as to how this conclusion was reached and Applicant is unable to find support for this naked assertion based on the doping techniques from Almogy.

In essence, the Office seems to take a form of official notice to support the conclusory obviousness rejections without proving explanatory comments. If it were obvious, then it should be easy to find a reference that suggests modifying the cited references to include a QWIP that includes the limitation as recited in claims 1, 11, and 16 regarding the asymmetric unit cells with adjacent different quantum wells and further with respect to the well spike. Examiner is kindly reminded that "assertions of technical fact in areas of esoteric technology must always be supported by citation of some reference work" and "allegations concerning specific knowledge of the prior art, which might be peculiar to a particular art should also be supported." MPEP § 2144.03. The Applicant notes that a reference that merely discloses or suggests the general concept of QWIPs or doping spikes is not sufficient to establish a prima facie case of obviousness. Rather, the reference or references must disclose or suggest a QWIP structures as defined by the Applicant's claims.

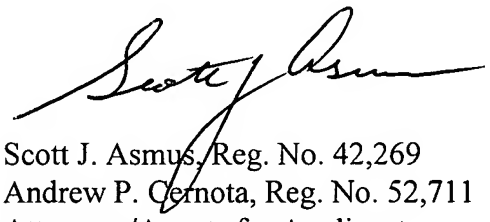
Telephone Interview

Present Office policy places great emphasis on telephone interviews initiated by the examiner. For this reason, it is not necessary for an attorney to request a telephone interview. Examiners are not required to note or acknowledge requests for telephone calls or state reasons

why such proposed telephone interviews would not be considered effective to advance prosecution. However, it is desirable for an attorney to call the examiner if the attorney feels the call will be beneficial to advance prosecution of the application. MPEP§408

Applicant believes the above amendments and remarks to be fully responsive to the Office Action, thereby placing this application in condition for allowance. No new matter is added. Applicant requests speedy reconsideration, and further requests that Examiner contact its attorney by telephone, facsimile, or email for quickest resolution, if there are any remaining issues.

Respectfully submitted,



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